Spomenik: Resurrecting Voices in the Woods

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ABSTRACT

Spomenik ('monument) is a digital memorial architecture that transposes in time otherwise hidden cultural memories of atrocity. Spomenik was designed as a simple digital audio guide, embedded in a remote rural location (Kočevski Rog, Slovenia), and working without the infrastructure normally present at national memorial sites. By resurrecting voices and cultural narratives of the deceased, positing them back in to the landscape through digital means, Spomenik opens a dialogue about the events of the past, in relation to networks of the living, exploring the role of voice and agency, as serviced through design in the act of memorialization. We contribute a detailed case study of a design-led inquiry about digital memorialization and digital preservation of cultural heritage, and a reflective account about the nature of legacy and the extent to which it is (and perhaps should be) necessarily bound to networks of collective memory, mediated through designed cultural tools.

1. INTRODUCTION

For many, a fundamental existential crisis arises from contemplation of mortality.[1] The desire to leave a legacy and tacit presence in the world after death can occupy people's thoughts, as they realize post-mortem existence resides in the memories of others. This orientation towards longevity through memory encourages memorialization, and in many respects we can understand human orientations to mortality through legacy-making.

Post-mortem remains and memorial artifacts are often architectural in scope.[2] Memorial architectures such as gravestones, tombs and even plaques are often conceptualized as spatialized markers of memory, as if they contain memories, keeping them alive.[3] Digital augmentations to gravesites have included just this kind of motivation, wherein digital content is 'attached' to grave markers.[4] This resonates strongly with persistent tropes in the study of personal informatics, which see digital tools as means to support better veridical recall of the past.[5] We wish however, to take an alternative perspective on memory. We see *remembering* as an enactive process, made manifest through the relationships and interactions we have with other people and technologies.

We draw inspiration from the work of Wertsch[6] on processes of collective remembering, and in particular from the exploration of this in relation to contentious memorial sites by Middleton and Murakami.[7] Memorialization, according to Wertsch, is inherently a socialized practice, and

remembering is in essence 'distributed between persons'. Wertsch locates the literal act of remembering within the individual, but the significance and meaning of the activity is given by how individual acts of remembering are interdependent with one another.[8] Wertsch is concerned with the dialectical relationship between active agents and cultural tools. We have therefore found it of interest to consider how memorial architectures, and associated digital interventions, come to mediate memory and processes of collective remembering as cultural tools.

Within the field of Human-Computer Interaction (HCI) there has been growing interest in end-of-life issues[9], thanatosensitive design,[10] legacy making,[11] and bereavement and grieving.[12] We draw upon these literatures because of their evident importance in unpacking the design of specifically *digital* memorial interventions.

Frameworks have been developed to conceptualize emerging practices of digital, physical and hybridized forms of memorialization,[13] building digital layers on to Hallam and Hockey's understandings of spaces of death.[14] Relevant work has also explored the nuances of legality and ethics around matters of digital legacy,[15] the requirements for care of researchers working in these spaces[16] and even visions of multi-lifespan development.[17] Much of this work however, draws focus on very personal relationships to the deceased or the grieving, with more of an emphasis on domestic and personal interactions with technology, and sits beyond an analysis of the networked relationships that potentially inform processes of memorialization.

Physical memorial sites themselves have also been extensively studied. In particular much research has explored contested sites of cultural heritage,[18] including particularly emotive settings such as holocaust memorials,[19] war memorials,[20] and roadside memorials.[21] However, this is often in the absence of any digital intervention at these sites. The study of these kinds of settings is necessarily 'in-the-wild' with concomitant challenges for methodology[22] and the politics of legitimate participation.[23]

Building on this and other work around designing support to cultural visiting,[24] we contribute in this paper a design-led study that explores novel configurations of digital technology to support memorialization practices.

Herein, we present a case study of Spomenik ('monument' in Slovenian), a prototype digital memorial architecture that transposes in time hidden cultural memories of atrocity. Spomenik was a mobile-phone based audio guide service embedded in a remote rural location (Kočevski Rog in Slovenia), which worked without the infrastructure normally present at national memorials. Spomenik was developed from a conceptual design proposed by one of the research team, Jim Kosem, and is entangled with his experiences of being raised within the Slovenian *diaspora* community in the United States. Our research team collaborated heavily with the Study Centre for National Reconciliation (SCNR) in Slovenia,[25] to recount known records of atrocity at one historic site. Digitally, an audio-record of victim and survivor testimony was transplanted to where it was historically redacted. The design was developed during a nine-month partner-collaboration. It served to augment visitors' experiences of the physical site by providing them

with a cloud-based service and mobile access to a first-person account of those memorialized.[26] The mobile application was accompanied by a web interface delivering both post-visit information and interaction but also presenting to 'virtual visitors' a holistic visualization of service use.

The process of developing and deploying Spomenik allowed us to explore, both conceptually and empirically, how new digitally spatialized 'landscapes of loss' may be articulated and given form, affecting a sense of mortality for those involved. Further, the design work allowed us to critically examine how networks of connected stakeholders (such as the victims, their relatives, the diaspora communities, the authorities, and institutions of cultural memory) are configured (and conceptualized) within this design process. In particular the Spomenik experience highlighted the distribution of 'actors' in both space and time, including remote diaspora members who were engaged with the grave site online and at a geographical distance. The work also allowed us to explore how legacy is constructed within a memorial design.

In the remainder of this paper we describe the context of this work, the system that was developed, and the process of our design-led inquiry to develop the memorial. In reflecting upon this process we discuss the designed configuration of legacy.

2. CONTEXT FOR THE WORK

The context for our work is the memorialization of people massacred in the summer of 1945 by communist partisans, whose bodies were interred in mass graves, across Slovenia.[27] During the ensuing c.45 years of Yugoslav communist rule, speaking about 'what happened in the woods' was illegal, resulting in reduced awareness of these events (especially amongst younger generations) . Despite the hostile political climate, some Slovenians discretely fought to memorialize those killed by marking known sites of atrocity, for example through acts of resistance such as marking trees (see Figure 1a).

Figure 1. Illicit marking of Slovenian mass grave site (1a left); Gigo designed monumental bell (1b right).

With efforts from the Catholic church within Slovenia, and the diaspora communities outside (largely based in the US, Canada and Argentina), records of victims in these mass killings were kept; these 'White Books' were constructed by diaspora communities and listed names, dates, locations of execution, and biographies, where known.

Following the collapse of the Socialist Federal Republic of Yugoslavia in 1991, recognition of the victims (via the government-led Commission on Concealed Mass Graves in Slovenia) has become more open and commonplace, with some sites officially designated national memorials. A key partner in this officially sanctioned memorialization has been Slovenian company Gigo Design. Gigo was commissioned to install monuments at seven sites across Slovenia. These incorporate a working bell, cast in bronze, resembling a tree trunk (see Figure 1b). The bell is rung by pushing the 'trunk'. Each bell has an engraved GPS code of its position and presents some basic information (location, nationalities of the victims, date and numbers of people killed) for each given site.

3. THE SPOMENIK AUDIO GUIDE SYSTEM

One of these seven memorial sites became the site of engagement for our Spomenik design project: Kočevski Rog, located in southern Slovenia. In this section we describe the audio guide system that was developed for this site, and then turn to unpack the Spomenik design process and how it responded to the project partners' voices and the cultures of memorialization that we

engaged in. By doing so we provide a case example of design-led inquiry that explores *mediated* mortality.

Spomenik formed a locative media 'audio-guide', accessed by site-visitors through personal mobile phones, inviting both situated and remote forms of engagement. The narrative content for the service constituted an audio recording of a spoken word testimony, written by one of the few survivors from this particular site of killing.[28] The entire audio content is 15 minutes in duration. The site itself features an existing information board at the entrance to the section of forest where the main grave site resides (the site itself is a cave located within that woodland), along with an additional sign that displays the phone number for our audio guide (Figure 2). This location is 'Station One' and is indicated with a number '1', the first of three, marked with corresponding signage. The audio guide user is invited to progress from one station to the next, and to use their mobile phone to call the service at each station to hear the next part of the unfolding story. Once narration has finished, the call is ended by our system.[29]

Figure 2. In situ signage for the Spomenik deployment reading "Call to find out what at one time happened here"

The service was configured so that the user might navigate backwards as well as forwards through the narrative episodes at the three stations. On first dialing, the user receives an introduction and is asked to confirm which station they are at, using number buttons on their phone. At this point, the system creates a profile for them and stores this in a database so that their interactions with the system may resume in the instance of a lost connection. Then the narrative episode is played. When the caller connects again, s/he is asked to confirm which station s/he is at, and can choose to hear the first

episode once again before proceeding with the second. These options are given again at Station 3. The user also has the option at Station 3, after following the whole narrative account, to leave a voicemail response about their experience. S/he also receives a text-message thanking him/her for their visit.[30]

4. DESIGN-LED INQUIRY

We now explore the Spomenik design process, and the configuration of the team in dialogue with our partners and stakeholders. Positioning Spomenik as a design-led inquiry, we further describe how our design concepts became resources for exploring and understanding the stakeholder relationships within the setting. The features and affordances of the developing audio guide prototype engaged those relationships in terms of practices of collective remembering, mediated by cultural tools.

Project origins, relations and partnerships

Spomenik formed part of a broader Pervasive Monuments project, designed to explore concepts of memorialization in the digital age. It originated as a personal project by Jim Kosem of Halfman Design. Having grown up in Cleveland, Ohio within a diaspora community of Slovenian émigrés and their children, he had heard family-stories of the events of 1945 since he was a small child, and was directly related to victims. The idea to develop digital support to realize his design solidified in conversations with the first author around shared research interests. Subsequently, an interdisciplinary project team (including Jim) was brought together to develop Spomenik. This account of the design process (the first full paper written about Spomenik) is principally developed from the reflections of the first two authors – but based on notes and recordings of design meetings produced during the project by all authors.

The collaborators on Spomenik were varied in terms of their degree of involvement (ranging from advice to content providers, from research critique to system building). Jim Kosem of Halfman Design, self-identified in an 'interaction design' role, with personal and professional interest and links to the design setting. Jim provided high-level project direction, and led the engagement with Slovenian partner organizations. He engaged in the co-design, implementation, and field testing of the prototype. Spomenik also involved a core group of investigators from the University of Nottingham, with expertise in genocide education, computer science, psychology, economics, geospatial science, and design. This group was engaged in a range of material activities that were research-oriented: project management, design critique and documentation; prototype co-design and implementation, testing and fieldwork. The Study Centre for National Reconciliation (SCNR) were our local 'hosts', organizing an engagement with the technology prototype and connecting to Slovenian partners. The National and University Library of Slovenia (NUK) provided content for the prototype and local information about the Spomenik site. Gigo Design were also involved, as discussants on their bell design, and on the interaction design research in the field.

Motivating design development

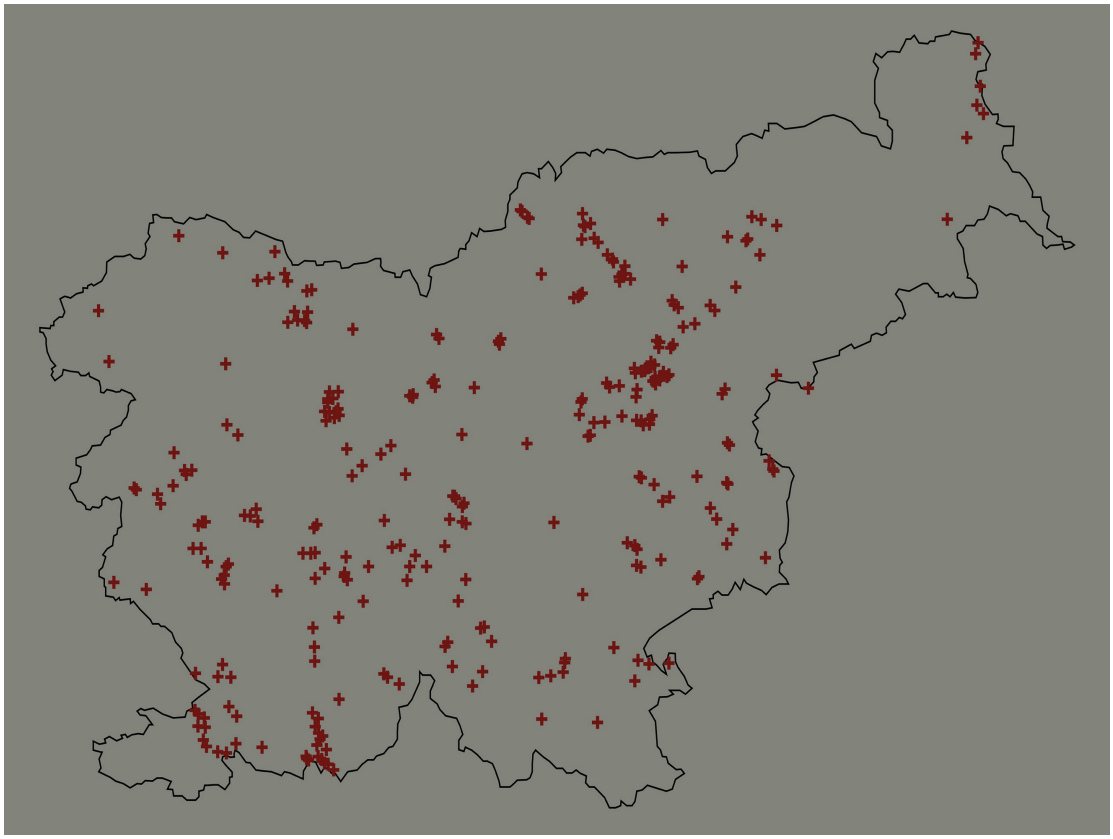


Figure 3. Map of Slovenia Mass Grave Sites

The collaborative design process was structured by group meetings and critiques over a 10-month period (across 2009/10). At the first stage of the project, Jim generated a number of conceptual designs for further marking and memorializing mass graves across Slovenia (see for example, Figure 3). These concepts took the form of graphical representations of site maps, and proposals for visual data representations to be delivered to audiences via a mobile interface (see Figure 4). Scenarios and storyboards of user interaction supported these proposals. Jim's concepts were presented to the project team not just as possible design directions but also to communicate his values about designing for this setting and his emotional connection to it, that motivated him to explore its memorialization. In discussing his design rationale, Jim conveyed to the rest of the research team the historical political complexity for both Slovenian nationals and diaspora, which needed to be addressed in the design engagement. He emphasized that discussing these events remained sensitive within the Balkan states. [31] Jim's presentations constituted a significant learning experience for the team; and he recognized an opportunity within the project to represent and give legitimate and authorial voice to the Slovenian diaspora in the US.

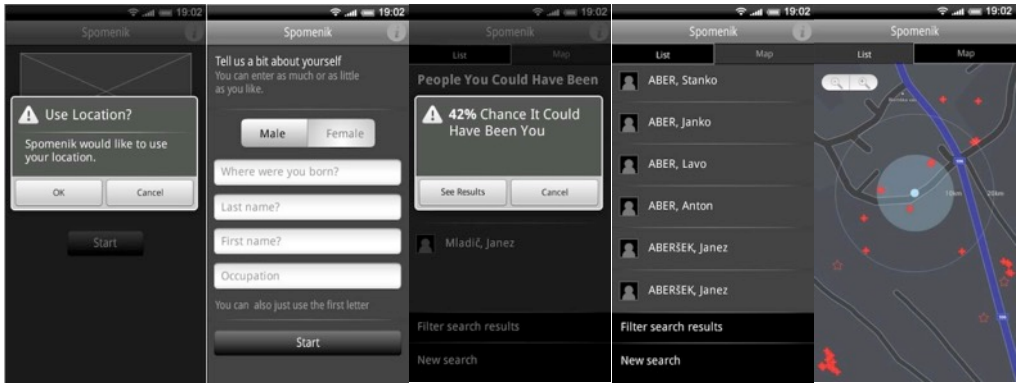
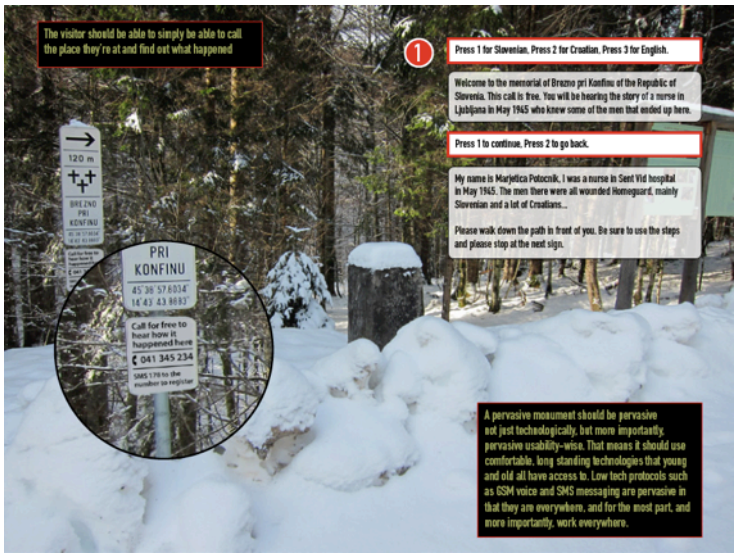


Figure 4. Storyboard from the initial design, presented by Halfman Design at an early meeting. From left to right: Spomenik as location-based; asking/requesting personal information; comparing user's similarity to victims by a simple similarity match between a profile and known victim information listing victims; locating victims;.

To help develop the design work, Jim conducted telephone interviews (snowballed sample of five) with Slovenian diaspora members, connected to his family friends in the US. His questions probed understanding of the massacres as historical events, the reasons why the interviewees left Slovenia, and issues around discussing and commemorating 'what happened'. Data gathered from the interviews was presented alongside an initial design vision at a team meeting. Spomenik was envisioned at this point as "a digital monument, which replays and relays the events of Communist political massacres in Slovenia for the education and remembrance of the average Slovenian citizen" (excerpt from Jim's presentation). A storyboard depicted a location-based mobile phone application (app), (Figure 4). This app would provide an interface for its user to "Find someone you might know", searching data from the White Books and displaying the locations of matching victims. In this design, the user is invited to explore narrative and biographical information drawn from the White Books. More provocatively, the interface also asked "Could it have been me?"; the app asked its user to provide their surname along with place of birth, and then informed them if they could have been a victim if they were transposed to the historical context of the massacres. As such, the design suggested a relational engagement with a memorial and empathetic connection with those memorialized.

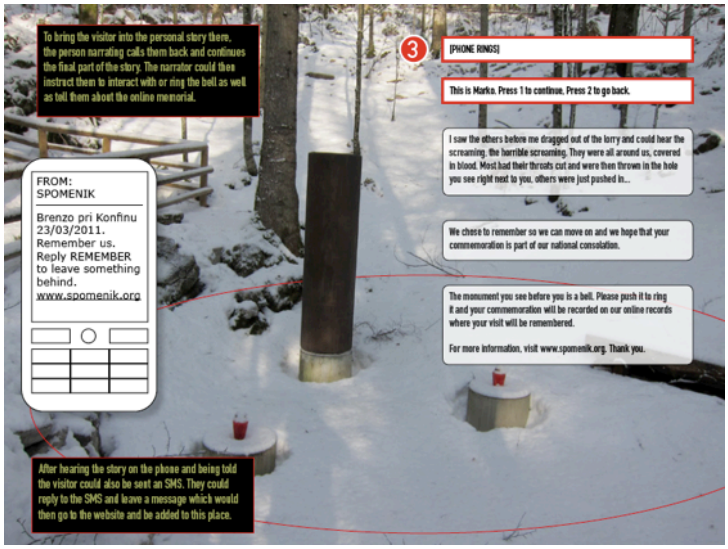
Discussion of this idea and initial interview findings raised a number of sensitizing concerns in the team that shaped our inquiry. The White Books were recognized as design inspiration – both in terms of their content and social function. Also, the design space for consideration was refocused for developing a monument in Slovenia, physically situated or 'placed' at a distinct site (see Figure 5). The team departed from the idea of incorporating mapping into the design or marking multiple sites (e.g. Figure 3). This is because it was not possible to *accurately* map records from the White Books to actual graves, and the interviews revealed the importance of 'facticity', and presenting information about the massacres with certainty; the diaspora members felt that ambiguity about inaccurate information would potentially undermine the legacy of those memorialized. Focusing on one site associated with first-hand testimony of genocide, alleviated

this issue. A third concern was to maximize accessibility for mobile technology users to support multi-generational engagement. A fourth concern was to represent 'both sides of history', including perspectives from the diaspora alongside more established perspectives in the country. And finally, there was a creative drive across the team to innovate on notions of 'Monument';[32] and to reconceptualize what a monument could be as a 'cultural visiting experience' supported by *pervasive digital* technology. These sensitizing concerns reflected the team's developing understanding of the complexity of relationships to the setting, acknowledging the political positioning of Jim's voiced values in the design process, which resonated with the voiced values of the diaspora members he had interviewed. Discussion also raised consideration of the ownership of knowledge related to this setting (about the genocide and its victims) and considerations of how value could be located, in economic terms, in a proposed service that could be *sustained* by those with vested interests.



(5a)

(5b)



(5c)

Figure 5. Storyboard from the first design, presented by Halfman Design in February. Additional signage for existing entry point to a mass grave (5a). Narrative driven by location with multiple way stops (5b). Final experience coordinated to drive interaction with existing memorial (5c).

Key to the project's development was a field trip to Slovenia by Jim and the team's genocide-education expert. They visited a number of marked graves (e.g. Figure 5c) to identify and experience the site for deploying Spomenik. Further semi-structured interviews were conducted on this trip, with Slovenian nationals including genocide survivors and partisans (sample of 5). The trip also enabled face-to-face coordination with Slovenian project partners SCNR and NUK, and included a visit to meet Gigo. Those who were brought into dialogue with the researchers were presented with the conceptual design for Spomenik (described above).

People's responses to this concept provided the team with a deeper understanding of the stakeholder context we were designing for along with further inspiration and constraints. We learned that genocide survivors and partner organizations in Slovenia wished to tell their stories to both national and international audiences. There was keen interest that Spomenik should serve to raise public awareness of the genocide with these audiences. The concept of the location-based, mobile phone application was found to capture the imaginations of interviewees, in terms of how the *victims*, interred in their hidden graves, could be remembered through recorded testimonies of others, accessed at the site. Again, those interviewed expressed concern and ethical questions about the use of 'historically accurate' information in Spomenik. One interest was to use mobile technologies for engaging younger audiences, and for the content developed for Spomenik to be made transferrable to other memorialization settings. And it was strongly communicated that there were *versions* of history in the public domain pertaining to this setting that needed to be negotiated when developing Spomenik, both in Slovenia and in the diaspora community more widely.[33]

Following this trip, the design space was narrowed to consider two concepts that were storyboarded and presented for team critique. The team opted for what became the final design (section 3 and Figure 5 above), but actually incorporated ideas from the second design concept: to configure the audio guide for learning, delivering educational content with the audio guide narrative. SCNR provided curated audio content for the three narrative episodes of the guide.

An initial working prototype of Spomenik was tested in the gardens at the National Holocaust Memorial Centre in Laxton, UK. All members of the core team experienced using the prototype, which gave us insight towards the proper pacing and bodily engagement of the experience. It also made evident the role of individual and group experience within service use. Reflecting on use, a key feature was developed for the final design: rather than 'staying on the line' during their walk between stations (Figure 5b), the visitor call-back feature was introduced (seen in the proposed signage of Figure 5a). This enabled more flexibility for social interaction with others in between stations.

Figure 6. Deployment of final Spomenik design with class of local school children.

Deployment of the final Spomenik prototype took place at Kočevski Rog (see Figure 6). The content provided by NUK was curated specifically to fit with the topology of this site and distances between stations. The intervention itself involved a further fieldtrip to Slovenia, by a subset of the team. For this deployment, we coordinated with our local partners to recruit a class of local school pupils (aged 15 to 17 years) to evaluate Spomenik. Participation was offered as an educational experience and, again, the Spomenik deployment comprised part of our design-led inquiry aiming to generate not just user insights per se but also new accounts of sense making around the historical genocide event, mediated by pervasive technology at the given site.

To report on the qualitative data collected and analyzed from the evaluation event is beyond the scope of this paper. We now turn to reflect on what we gained through our design-led approach to inquiry, describing how complex human relationships to sites of memorialization can be meaningfully augmented and transformed by creating and deploying pervasive, mobile connections.

5. UNDERSTANDING LEGACY THROUGH DESIGN INQUIRY

Below we focus on three phenomena that surfaced with relative frequency through our inquiry, situating them within the context of our design-led approach, namely: how legacy is delivered through networks of actors; how legacy modifies place; and infrastructure for sustaining legacy.

Legacy through networks of actors

Coming back to one of our originating arguments is the idea that mortality (and therein legacy) is maintained through active remembrance of networks of others. Accordingly, in developing the Spomenik concept we explored how the human dimension of memorialization was configured in our design setting. Whilst it was evident from inception who was to be memorialized by Spomenik, team discussions frequently centered on trying to understand 'who' the memorial would serve. Questions were raised around how various stakeholders were conceptualizing system 'users' and how its design was delivering something of value to them. This led to the design space being dynamically re-imagined as the project progressed. Initially we assumed the memorial would be for older generation Slovenians who had kept the site alive and those local Slovenians who wanted to reveal this otherwise hidden history. But based on our early insights, we began to think more about how to design the experience for *diaspora communities*, leveraging the affordances of a web interface to connect them to the site from a distance. Building in a remote connection to the physical site served to ameliorate anxieties held by diaspora members about their history being redacted from the land they used to call Home.

However, in its final configuration, Spomenik responded to diaspora concerns to target school-aged children, who it was felt were variously restricted from developing historical understanding. Curiously, even as the form factor of the design changed during its stages of development, the biggest shifts in scope were both geographic (in terms of the *communities served*) and temporal (shifting from serving legacy amongst those contemporaneous to the massacres to those separated by several generations, who have no direct experience).

Our inquiry resulted in a design that serves a network of relationships mediated through different features of digital technology. The web elements served the diaspora community at a distance showing them active engagement with the memorial setting. The activity *in situ* supported the older locals who struggled to maintain the memorial during the Communist regime. Further physical signage for the service created a sense of permanence to the memorial and, arguably, existence to those genocide victims previously made invisible in certain versions

of history. For the school children, mobile technology provided them with means to engage more deeply and personally with a context that might otherwise be alienating.

Through repatriated data to Slovenia (records from those who had survived within Slovenia and those from the diaspora), we have found how remembering the genocide victims ultimately becomes a process of active engagement within the human-network. Jim's design vision for Spomenik, and his self-identification within the diaspora, motivated the development of concepts through emotionally charged sense-making around the history of the grave site, a volitional drive towards certain forms of representation at the site, and a legitimate voice as a diaspora member. In this case we have observed how Jim was using the language of design (from graphic design to physical prototyping) to foster dialogue, leading to the understanding of multiple stakeholder voices.

Spomenik created a dialogical space for the stakeholders to foster agency in their memorialization practices enacting legacy in various ways. For Jim it served his sense of duty to his community and family. For NUK it showed contemporary relevance to their work, and for SNCR it raised profile for their mission to foster acknowledgement and reconciliation over events. For Gigo it potentially invited people to the setting so that they might encounter their original Bell design.

Legacy and the modification of place

Early design ideas had considered bringing the mass grave mapping down to an 'encounterable' scale so that it could be transposed (and therefore experienced) in various settings. However, in the final design we chose to work exclusively with one site – one that already had a partial legacy of memorial architecture. The digitally driven aspects of the Spomenik experience therefore had to sit alongside or subtly overlay the legacy infrastructure; the design had become site-specific plus there were inherent sensitivities at play. As such we recognized we were potentially 're-making' the space[34] – by, for example, manipulating the movement and behaviors of people within it. What had *become* resting places were being given the potential to be made 'restless' again through digital intervention, something we were at pains to avoid.[35] There was also an extent to which we were consciously constructing an 'uncomfortable interaction',[36] wanting to express something of harrowing experiences lived through in a setting that had become a peaceful and respectful place, whilst seriously considering the ethical implications of the intervention and the affective, educational context of engagement.

Through the Spomenik system, the site of Kočevski Rog became imbued with a new sense of mortality (it being a grave site – a resting place – and incidentally somewhere that was formerly hidden and hoped to be forgotten). But at the same time the temporal bounds of human mortality and concomitantly the legacy of memories invested in the site were reimagined by the newly persistent digital trace of the physical activity at the site. Equally, the disembodied voices in the wire became embedded and this, to some extent, provided these voices with a new legacy, a

corporeality, through a transformed hybrid digital-physical setting. As such, Spomenik connected cultures and communities of people distributed across both space and time, beyond the human lifespan.

Infrastructure for sustaining legacy

In our design work for Spomenik, we encountered some specific challenges around maintaining legacy, not least because of the potentially contested nature of this historic setting,[37] but also by virtue of the network of stakeholders and their competing voices within the memorialization process.[38] There were legitimate arguments over whose history was being accounted for. The nature of transplanting 'memories' that had been rehearsed by a diaspora community into the landscape of another country – one that had pursued an alternative account of history for 60 years – inevitably raised tensions. The stakeholders had to negotiate these tensions (it being of far less consequence for a diaspora community to make provocative statements than for a local government-funded institution). These issues brought to the fore the legitimacy of *who* can enact memorialization. With Jim being a member of the diaspora community, a Slovenian speaker, and sometime resident, it felt appropriate for him to lead our endeavours. Ironically however, it is an evident feature of mortality that our legacies are not our own, they are in the making of those who deal with them after our deaths; the interpretation of events is therefore mediated by the voices of others.[39]

Designing infrastructure to scaffold discussion and dialogue[40] was found to offer clear benefits (that have been noted), but also a range of 'design dangers'. For instance, as our team's education expert pointed out, exposing system users (such as school students) to ethical questions might fit well with what was known about effective genocide-education practices. However, a system supporting discussion, dialogue and the reconciling of different perspectives is open to subversion (for instance, fears regarding denial of the massacres, hate speech, modern-day partisan attitudes, etc.).

One final consideration is the legacy of the service itself and its economic sustainability post-project. The research team discussed handover of the prototype with key stakeholders (NUK/SNCR), and investigations were made about balancing the costs of the service and responsibilities of ownership, financial investment, and maintenance. Spomenik has potential to be configured as a social enterprise. A largely standalone mobile application would require maintenance, support and data connectivity, whereas an automated telephony service works anywhere with a phone signal and could generate enough income to sustain itself, at least for as long as the service remains to be used by visitors and valued by stakeholders. By taking the form of a pervasive service rather than a physical monument like the Gigo bell design (Figute 1b), Spomenik raises new design considerations pertaining to the inherent mortality of system elements and *their* legacy, and the requirement for motivated humans to sustain interest in maintaining the monument to keep it alive.

Concluding Discussion: On Collective Memory

In closing we reflect upon the notions of collective memory raised in the Introduction. As our three themes have shown, within this design-led inquiry we explored mortality through the lens of legacy and the agency of various actors to manipulate it. We have also seen the ways in which perspectives on mortality and legacy are mediated by cultural tools that we engage with (e.g. related to language, history, politics) and also that we generate (e.g. websites, audio-guides, visiting experiences). This resonates strongly with Wertsch's notion of 'cultural tool mediation' in the production of collective memory and reinforces the notion that mortality is deeply connected to remembering, and it is this aspect that people most readily seek to manipulate when enacting legacy through performing acts of remembrance and memorialization. The design of Spomenik has led us to think more deeply about the implications of designing memorials for others that utilize digital technologies. Digital layering offers up opportunities to expand the network of connected stakeholders, configuring them in certain ways and mediating their access to the memorial. The Spomenik project led us to intervene in and manipulate physical spaces in emotionally engaging ways, offering new opportunities for legacy making and reflection. All of these possibilities however, have unique and interrelated dependencies, which offer substantial challenges to the designer and which cannot be addressed lightly. They require substantial sensitivity to the expanding network of human relationships in the memorialization context and a commitment to explore the multiplicity of voices that constitute collective memory.

Acknowledgements

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[1] Bernard Schumacher, *Death and Mortality in Contemporary Philosophy* (Cambridge University Press, 2010)
[2] Nigel Llewellyn, *The Art of Death*. (London: Reaktion Books Ltd, 1991)
[3] Avril Maddrell and James D. Sidaway, *Deathscapes: Spaces for Death, Dying, Mourning and Remembrance*. (Routledge, 2010)
[4] For discussion see Bjorn Nansen, Michael Arnold, Martin Gibbs, and Tamara Kohn, "The Restless Dead in the Digital Cemetery," in *Digital Death: Mortality and Beyond in the Online Age*, ed. Christopher M. Moreman and A. David Lewis (Santa Barbara: Praeger, 2014), 111-124
[5] For a critique of this position see: Chris Elsden, David Kirk, and Abigail Durrant, "A Quantified Past: Toward Design for Remembering With Personal Informatics," *Human–Computer Interaction* 31, no. 6 (2016): 518-557
[6] James Wertsch, *Voices of Collective Remembering*, (Cambridge University Press, 2002)
[7] David Middleton, and Kyoko Murakami, "Collectivity and Agency in Remembering and Reconciliation," *Outlines. Critical Practice Studies* 5, no. 1 (2003): 16-30
[8] Ibid.

[9] Michael Massimi, William Odom, Richard Banks, and David Kirk, "Matters of Life and Death: Locating the End of Life in Lifespan-Oriented HCI Research," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI '11).* (ACM, 2011), 987-996.
[10] Michael Massimi and Andrea Charise, Dying, "Death, and Mortality: Towards Thanatosensitivity in HCI," in *Extended Abstracts of ACM Conference on Human Factors in Computing Systems (CHI EA '09).* (ACM, 2009), 2459-2468
[11] William Odom, Richard Harper, Abigail Sellen, David Kirk, Richard Banks, "Passing On & Putting to Rest: Understanding Bereavement in the Context of Interactive Technologies," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI '10).* (ACM, 2010), 1831-1840
[12] William Odom, Richard Banks, David Kirk, Richard Harper, Sian Lindley and Abigail Sellen, "Technology Heirlooms? Considerations for Passing Down and Inheriting Digital Materials," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI '12).* (ACM, 2012), 337- 346
[13] Wendy Moncur and David Kirk, "An Emergent Framework for Digital Memorials," in *Proceedings of the ACM Designing Interactive Interfaces (DIS'14)*, (ACM, 2014), 965–974
[14] Elizabeth Hallam and Jenny Hockey, *Death, Memory and Material Culture*. (Oxford: Berg, 2001)
[15] Jed Brubaker, Lynn Dombrowski, Anita Gilbert, Nafiri Kusumakaulika and Gillian Hayes, (2014) "Stewarding a Legacy: Responsibilities and Relationships in the Management of Post-Mortem Data," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'14),* (ACM, 2014), 4157-4166
[16] Wendy Moncur, "The Emotional Wellbeing of Researchers: Considerations for Practice," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'13),* (ACM, 2013), 1883–1890
[17] Batya Friedman and Lisa Nathan, "Multi-lifespan Information System Design: A Research Initiative for the HCI Community," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'10),* (ACM, 2010), 2243-2246
[18] Liz Sevcenko, "Sites of Conscience: New Approaches to Conflicted Memory," *Museum International* 62, no. 1-2 (2010): 20-25
[19] Shaul Krakover, "The Holocaust Remembrance Site of Yad Vashem Welcomes Visitors," *International Research in Geographical and Environmental Education* 11, no. 4,(2010): 359-362
[20] Zachary Beckstead, Gabriel Twose, Emily Levesque-Gottlieb and Julia Rizzo, "Collective Remembering through the Materiality and Organization of War Memorials." *Journal of Material Culture* 16, no. 2 (2011): 193-213
[21] Anna Petersson, "The Production of a Memorial Place: Materialising Expressions of Grief." In (Ed) Avril Maddrell and James D. Sidaway, *Deathscapes: Spaces for Death, Dying, Mourning and Remembrance*. (Routledge, 2010), 141-159
[22] Barry Brown, Stuart Reeves and Scott Sherwood, (2011) "Into the Wild: Challenges and Opportunities for Field Trial Methods," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'11),* (ACM, 2011), 1657-1666
[23] Lilly Irani, Janet Vertesi, Paul Dourish, Kavita Philip and Rebecca E. Grinter, "Postcolonial Computing: A Lens on Design and Development," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'10),* (ACM, 2010), 1311-1320
[24] See for example, Paul Aoki, Rebecca Grinter, Amy Hurst, Margaret Szymanski, James Thornton and Allison Woodruff, "Sotto Voce: Exploring the Interplay of Conversation and Mobile Audio Spaces," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'02),* (ACM, 2002), 431-438
[25] Through SCNR we also collaborated with the National University Library of Slovenian and the national poet.
[26] The account represents a narrative of a survivor of the massacre that took place there. The site holds some c.2200 dead, the account itself was generated by one of the five to seven survivors.
[27] These events are described in detail in John Corsellis and Marcus Ferrar, *Slovenia 1945: Memories of death and Survival After 1945.* (I.B. Tauris, 2015). The site we chose to work with was picked by SCNR as it was assumed to contain remains of primarily ethnically German, Slovenian nationalists, however most of the Slovenian mass grave sites contain remains of various mixes of Croatians, Serbians, Montenegrans, Albanians, Bosnians, Ukrainians/Russians (Cossacks generally), Germans, Italians and Hungarians.
[28] The content was sourced by the National Library in Slovenia and had likely been previously archived by the Slovenian diaspora community in Argentina.
[29] The system employs a cloud-based telephony service, Tropo, in order to support these various functionalities. The scripts employ the following functionality supported by Tropo: the programmatic handling of voice calls and general call control (e.g., ending a call), number button input, outbound SMS, and voice call recording. In this way, Tropo provides a simple interface to the potentially complex aspects of telephony-based applications.
[30] In addition to audio-guide handling, the system also provides a website front-end that presents online information about the grave site, and displays the number of visitors to the physical site (as logged via calls to the system), along with any recorded responses by callers.
[31] That is, events designated as crimes against humanity
[32] This moved away from discussions of statuary and the visual arts in memorialization, as presented in Llewellyn (1991).
[33] And, of course, through other regions in the former Yugoslavia affected by these events memorialized.
[34] Paul Dourish, "Re-space-ing Place: "Place" and "Space" Ten Years In," in *Proceedings of the 2006 Conference on Computer supported Cooperative Work* (CSCW '06). (ACM, 2006): 299-308

[35] To use the language of Nansen et al. 2014
[36] Steve Benford, Chris Greenhalgh, Gabriela Giannachi, Brendan Walker, Joe Marshall and TomRodden, "Uncomfortable Interactions," in *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'12),* (ACM, 2012): 2005-2014
[37] Sevcenko (2010)
[38] Middleton and Murukami (2003)
[39] Ibid.
[40] Wertsch (2002)